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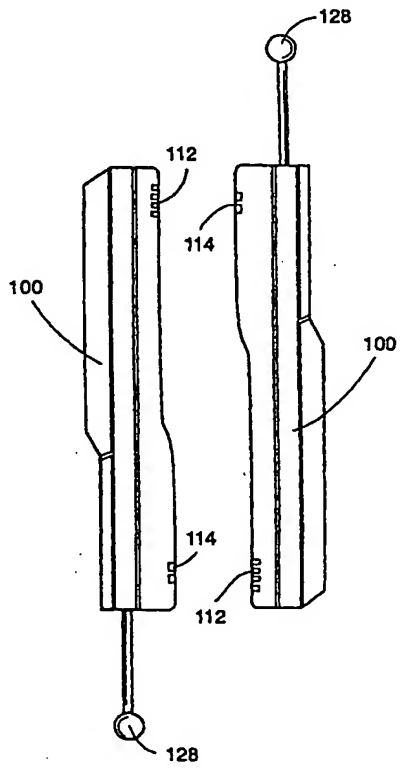
(54) Title: AUTOMATIC DIRECT TRANSFER OF USER DATA IN WIRELESS COMMUNICATIONS DEVICES

(57) Abstract

A direct communications approach is used to automatically transfer user data from one wireless communications device (100) to another (100). The two wireless communications devices, such as cellular telephones, directly communicate over an intervening medium using light, sound (112, 114), or electromagnetic energy (128) as appropriate. The medium is not "intelligent," but is instead passive. Examples of such medium include air, a vacuum, or a passive cable interconnecting the two wireless communications devices. In one preferred embodiment, audio tones, such as four column DTMF tones, are used to transfer the user data.



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# AUTOMATIC DIRECT TRANSFER OF USER DATA IN WIRELESS COMMUNICATIONS DEVICES

## Field of the Invention

The present invention relates to the field of data transfer between two wireless communications devices, and more particularly to automatic direct transfer of user data between two wireless communications devices using a passive medium.

## Background of the Invention

Users of wireless communications devices, such as cellular telephones, personal digital assistants, and the like, often desire to obtain newer versions of such devices, so as to be able to take advantage of new or additional functions offered by such new devices. However, such users typically have invested significant time in entering user specific information into the "old" device. This user information ("user data") may include a "phone book" of names, numbers, addresses, titles, and the like; appointment schedules and other reminders; custom settings of alarm sounds; and other like information. This type of information is to be differentiated from the type of information entered or programmed by a manufacturer, such as the electronic serial number, allowed options, and generic operating programs. The difficulty associated with transferring the user data from the "old" device to the "new" device has proven a significant disincentive to widespread user acceptance of the newer devices.

Under the existing art, users can manually enter their user data into the new device. However, such an approach is error prone and can be extremely time consuming for users with large amounts of user data. Alternatively, an intervening

personal computer or the like could be used to transfer the user data. Both the new and old devices would be attached to the computer via cables. Thereafter, specialized software in the computer would query the old device for user data and forward the user data to the new device, with translation if appropriate. With such an approach, the user data from the old device could be transferred to the new device somewhat automatically. This approach is cumbersome in that a suitable computer, armed with the appropriate software, must be available. However, collecting and maintaining the required hardware and software is not economically feasible at many locations. Further, an approach relying on such external intervening "smart" hardware/software may create bottlenecks in supply which may impede rapid deployment of new technology, especially if the number of suitably maintained locations is limited.

Thus, there remains a need for a method of automatically transferring user data from one wireless communications device to another wherein the two wireless communications device can communicate directly without relying on external intervening "smart" hardware/software.

## Summary of the Invention

The present invention uses a direct communications approach to automatically transfer user data from one wireless communications device to another. The two wireless communications devices directly communicate over an intervening medium using light, sound, or electromagnetic energy as appropriate. The medium is not "intelligent," but is instead passive. Examples of such a medium include air, a vacuum, or a passive cable interconnecting the two wireless communications devices.

The two wireless communications devices should have compatible transfer protocols programmed therein, and preferably the same transfer protocol. One example of a suitable protocol includes sending discrete packets of information and wherein the packets include a start of message indicator, an indicator of data type, a length of data indicator, selected user data, and error detection coding. In one preferred embodiment, audio tones, such as four column DTMF tones, are used to transfer the user data, such as by using two DTMF tones for each eight bits of the packet. Accordingly, if audio tones are used, the source wireless communications device preferably includes a DTMF tone generator and the destination wireless communications device preferably includes a DTMF tone detector. Data transfer is then preferably accomplished by automatically converting existing user data stored in the source wireless communications device into a sequence of audible tones emitted at the respective speaker; directly detecting the sequence of audible tones produced thereby at the destination wireless communications device, converting the detected audible tones into transferred user data; and storing the transferred user data in the destination wireless communications device. Such a transfer may be of only a portion of the user data in the source wireless communications device, but is preferably of all the user data present in the source wireless communications device.

The present allows for the user information in one wireless communications device to be directly loaded into another wireless communications device. The invention may use any protocol and/or data packet arrangement known in the art provided there is direct communication between the two wireless communications devices and the user data transfer is essentially automatic once started. The use of such an approach allows for great flexibility in transferring user data and may be

done at the user's convenience and because no sophisticated external hardware or software is required.

## Brief Description of the Drawings

**FIGURE 1** is a perspective view of one embodiment of a cellular telephone according to the present invention.

**FIGURE 2** is a simplified functional block diagram of the cellular telephone of Figure 1.

**FIGURE 3** shows two phones positioned for data transfer using DTMF audio tones.

**FIGURE 4** is a simplified flow diagram of one embodiment of the data transfer process.

**FIGURE 5** is a representation of one embodiment of a data packet showing various message segments.

## Detailed Description

Referring now to the drawings, the present invention for automatic direct data transfer of user data between two wireless communications devices will be described. In this illustration, the wireless communications devices are digital cellular telephones operating in a wireless network, such as one operating according to TIA Standard IS-136. While cellular telephones are used for illustrative purposes, the present invention is not limited to only such cellular telephone wireless communications devices, but is instead applicable to all wireless communications devices, including cellular telephones of any type, personal digital assistants, enhanced pagers, and the like.

Figure 1 shows one embodiment of a cellular phone 100 suitable for use with the present invention. The phone 100 shown in Figure 1 is a cellular telephone that includes a fully functional radio transceiver capable of transmitting and receiving digital signals. Referring to Figures 1 and 2, a phone 100 preferably includes a control unit or logic unit 102, a memory 150, an operator interface 104, a transmitter 120, an antenna 128, and a receiver 140. The operator interface 104 includes a display 106, keypad 108, control unit 110, microphone 112, speaker 114, and alarm 116. The display 106 allows the user to see dialed digits and call status information. The keypad 108 allows the user to dial numbers, enter commands, and select options. The control unit 110 interfaces the display 106 and keypad 108 with the control unit 102. The microphone 112 receives audio signals from the user and converts the audio signals to analog signals. Speaker 114 converts analog signals from the receiver 140 to audio signals that can be heard by the user. The alarm 116 produces an audible tone to notify the user in case of receipt of an urgent message or other conditions.

The analog signals from the microphone 112 are applied to the transmitter 120. The transmitter 120 includes an analog-to-digital converter 122, a digital signal processor 124, and a modulator 126. The analog to digital converter 122 changes the analog signals from the microphone 112 into a digital signal. The digital signal is passed to the digital signal processor 124. The digital signal processor 124 compresses the digital signal and inserts error detection, error correction and signaling information. The compressed and encoded signal from the digital signal processor 124 is passed to the modulator 126. The modulator 126 converts the signal to a form that is suitable for transmission on a RF carrier.

The receiver 140 includes an demodulator 142, a received signal processor 144, and a digital to analog converter 146. Received signals are passed to the demodulator 142 which extracts the transmitted bit sequence from the received signal. The demodulator 142 passes the demodulated signal to the digital signal processor 144 which decodes the signal, corrects channel-induced distortion, and performs error detection and correction. The digital signal processor 144 also separates control and signaling data from speech data. The control and signaling data is passed to the control unit 102. Speech data is processed by a speech decoder and passed to the digital-to-analog converter 146. The digital-to-analog converter 146 converts the speech data into an analog signal which is applied to the speaker 114 to generate audible signals which can be heard by the user.

The control unit 102, such as a programmed microprocessor, functions to coordinate the operation of the transmitter 120 and the receiver 140. Memory 150 stores the program instructions and data needed by the control unit 102 to control phone 100. The functions performed by the control unit 102 include power control, channel selection, timing, as well as a host of other functions. The control unit 102 inserts signaling messages into the transmitted signals and extracts signaling messages from the received signals. The control unit 102 responds to any base station commands contained in the signaling messages, and implements those commands. When the user enters commands via the keypad 108, the commands are transferred to the control unit 102 for action.

The phone preferably also includes a DTMF generator 160 and a DTMF detector 170 in communication with the control unit 102. For purposes of this invention, the DTMF generator 160 operates in cooperation with the speaker 114 to

generate DTMF audio tones in any manner well known in the art. Likewise, the DTMF detector 170 operates in cooperation with the microphone 112 to detect DTMF audio tones in any manner well known in the art. The DTMF generator 160 and DTMF detector 170 may be discrete components or may be portions of other components, such as a digital signal processor 124, 144 or the control unit 102. Alternatively, the DTMF generator 160 and the DTMF detector 170 may be software programs in the digital signal processors 124,144 or the control unit 102.

In addition, the phone includes user data, preferably stored in user memory 155. The user memory 155 can be an operational register within the control unit 102 or an address space in memory 150. The user memory 155 could also be a separate ROM, battery backed-up RAM, or EEPROM memory module, or the like. Preferably, the user memory 155 is of a non-volatile memory type. User data may include any or all of the following: "phone book" entries of names, numbers, addresses, titles, and the like; alarm information of time, date, and type of alarms and other reminders of events; appointment information; memos; and other like information. This "user data" type of information is to be differentiated from the type of information entered or programmed by a manufacturer, such as electronic serial number, allowed options, and generic operating programs, generally referred to as "manufacturer data." There are a wide variety of approaches for storing and using such user data. Any method known in the art may be used as the particular details of such are not important for understanding the present invention.

The present invention is directed at the automated transfer of such user data from one phone to another using a direct communication approach. As used herein, "direct communication" means that the two devices communicate without an

intervening smart device such as an intervening external computer. For instance, "direct communication" exists between the two phones when they are interconnected by a simple passive cable; or when they are communicating via light emitted from one phone and detected by the other; or when they are communicating via sound waves emitted from one phone and detected by the other; and the like. On the other hand, direct communication would not exist where the two phones are communicating via an intervening computer, base station, transponder, or other "smart: device. For ease of description, the term "medium" will be used to collectively refer to the vacuum, air, cable, or other intervening substance, or combination of substances, through which the two phones communicate directly.

For purposes of illustrating the operation of the data transfer, it will be assumed that the two phones communicate via audio tone pairs generated by their respective DTMF generators 160 and detected by their respective DTMF detectors 170 and that the medium is air. Further, phone A is assumed to be the source of the user data; for this illustration, this corresponds to the "old" phone. Using four column DTMF tones, each DTMF tone may be any one of sixteen tones, meaning each audio tone pair corresponds to an eight bit value. Of course, the use of other DTMF arrangements, such as three column DTMF tones, are also within the scope of the present invention. After the user initiates the transfer process (step 200) by, for instance, pressing a suitable key combination on the keypad of phone A, the phones 100 are oriented for direct communication, such as being put in the position shown in Figure 3. Preferably, the user is allowed to establish such positioning either before or after the transfer is initiated (step 200), so as to allow for greatest flexibility.

The overall process is illustrated in Figure 4. Phone A sends a start of transfer indicator (step 210); in this illustration, a particular audio tone, such as one representing hex A5. Phone A then waits a predetermined time for a response from phone B (step 220). If not received, phone A may resend the start of transfer tone pair (step 210). After a suitable number of unsuccessful tries, phone A may generate an alarm to indicate an error has occurred.

Once phone B responds, transfer of user data may begin (step 230). Phone A selects a first data packet and coverts the data packet 300 to a series of audio tones (step 240), thereby transmitting the first data packet 300 to phone B. Phone A then awaits an acknowledgement from phone B (step 250). If no acknowledgement is received, phone A may resend the data packet 300 (step 240). When phone B acknowledges (step 250), phone A checks for more user data (step 260). If more user data is to be sent, then the next data packet 300 is selected (step 270) and thereafter sent (step 240), and so forth. When all the user data has been sent, phone A generates an end of transfer tone pair and the process ends (step 280). Alternatively, a plurality of data packets 300 may be sent by phone A before phone A waits for an acknowledgement.

An example of one possible arrangement of a data packet 300 is shown in Figure 5. The data packet includes a start of message (SOM) segment 310 which indicates where the data packet 300 begins. Following the SOM 310 are category 320 and sub-category 325 segments. These segments 320,325 help describe the type of data that is being sent. For instance, the category segment 320 may help differentiate between phone book data, alarm data, appointment data, and so forth. The sub-category segment 325 helps further identify the type of data, such as by

indicating that the following data segment 340 represents the last name of the phone book entry, or the appointment time, etc. The length segment 330 indicates the length of the data segments 340 that follow. Following the length segment 330 is one or more data segments 340. Because, in this illustration, each audio tone pair is limited to an 8 bit word, but the data may easily be one thousand bits or more, there may be anywhere from one to N data segments 340, where N may be any number. Preferably, N is not larger than thirty-two, but this is not required. The final segment 350 is a check sum (Csum) segment which is used for error coding to increase reliability. Obviously, error coding is not limited to check sums, and any method known in the art for error detection and/or correction may be used.

The discussion above has focused on a particular data transfer protocol using data packets 300. This approach has the advantage of allowing the phone receiving the user data to integrate the received user data in any suitable manner. For instance, it is quite possible that phone A may store the user data in a different fashion than phone B. Further, phone B may interrelate the portions of the user data in a different manner than phone A. Thus, it may be advantageous for the mechanics of data transfer communications to focus on the type of user data being transferred, rather than on dictating how the information should be stored in the receiving phone. Of course, the present invention does not require that any one protocol be used. Instead, any data transfer protocol known in the art may be used. All that is required is that the protocol of phone B be at least compatible with the protocol of phone A. Preferably, all phones from one manufacturer would be programmed with at least one common protocol so that such devices may easily

transfer user data therebetween, thereby allowing easy trade-ups of the manufacturer's equipment.

As indicated above, the present invention may utilize other approaches than audio tones, such as DTMF tones, to directly communicate user data between the source phone and the destination phone. For instance, each phone may include an infrared emitter and an infrared detector instead of, or in addition to, the audio components 160,170 which may be used for the direct communication of user data between the two phones. Alternatively, the each phone may include a receptacle which mates with a corresponding connector on each end of a connectorized cable interconnecting the two phones. It is anticipated that such a cable would be a passive component, meaning that it would contain no intelligent components. Such a cable may be a traditional metallic conductor cable, or an optical cable, or any other passive cable known in the art.

The invention described above allows for the user information in one wireless communications device to be directly loaded into another wireless communications device. The invention may use any protocol and/or data packet arrangement known in the art provided there is direct communication between the two wireless communications devices and the user data transfer is essentially automatic once started. Preferably, the two wireless communications devices have been programmed with the same protocol, but all that is required is that the protocols be compatible. The communications media connecting the two wireless communications devices may be air, a passive cable, or any other intervening substance which allows direct communications, such as direct radio transmission. The use of such an approach allows for great flexibility in transferring user data.

Such transfer may be done at the user's convenience and no sophisticated external hardware or software is required.

The present invention may, of course, be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

## CLAIMS

What is Claimed is:

1. A method of transferring user data between a first wireless communications device and a second wireless communications device, comprising:

a) establishing direct communications between said first wireless communications device and said second wireless communications device via a medium;

b) initiating a data transfer session; and

c) automatically transferring selected user data, using said direct communications, from said first wireless communications device to said second wireless communications device via said medium according to said transfer protocol.

2. The method of claim 1 wherein said first and second wireless communications devices are interconnected by passive cable and wherein said transferring occurs through said cable.

3. The method of claim 1 wherein said transferring is accomplished using audio tones.

4. The method of claim 3 wherein said audio tones are DTMF audio tones.

5. The method of claim 1 wherein said transferring is accomplished using infrared light pulses.

6. The method of claim 1 wherein said transferring is accomplished using direct radio transmissions between said wireless communications devices.

7. The method of claim 1 wherein said user data relates to one or more of the following: phone book entries, alarm information, appointment information, and memo information.

8. The method of claim 1 wherein said first wireless communications device includes a transfer protocol programmed therein and wherein said transferring is according to said transfer protocol.

9. The method of claim 7 wherein said transfer protocol includes sending discrete packets of information and wherein said packets include a start of message indicator, an indicator of data type, a length of data indicator, selected user data, and error detection coding.

10. The method of claim 9 wherein said transferring is accomplished using audio tones and wherein said audio tones are generated by using two DTMF tones for each eight bits of said packet.

11. The method of claim 1 wherein said first wireless communications device includes a DTMF tone generator and said second wireless communications device includes a DTMF tone detector and wherein said transferring further includes generating audio tones at said DTMF tone generator and detecting said audio tones at said DTMF tone detector.

12. The method of claim 1 wherein said transferring includes transferring all of said user data present in said first wireless communications device to said second wireless communications device.

13. The method of claim 1 wherein said first wireless communications device is a cellular telephone.

14. The method of claim 1 wherein said first and second wireless communications devices are cellular telephones.

15. The method of claim 1 wherein:

a) said first wireless communications device includes a transfer protocol programmed therein; wherein said transfer protocol includes sending discrete packets of information; wherein said packets include a start of message indicator, an indicator of data type, a length of data indicator, selected user data, and error detection coding; wherein said transferring is according to said transfer protocol;

b) said first wireless communications device includes a DTMF tone generator and said second wireless communications device includes a DTMF tone detector;

c) said transferring further includes generating audio tones at said DTMF tone generator and detecting said audio tones at said DTMF tone detector; and

d) said user data relates to one or more of the following: phone book entries, alarm information, appointment information, and memo information.

16. A method of transferring user data between a first wireless communications device and a second wireless communications device, comprising:

a) automatically converting, by the first wireless communications device, existing user data stored in the first wireless

communications device into a sequence of audible tones at the first wireless communications device;

b) directly detecting, at the second wireless communications device, said sequence of audible tones produced by the first wireless communications device;

c) converting, by said second wireless communications device, said detected audible tones into transferred user data; and

d) storing said transferred user data in said second wireless communications device.

17. The method of claim 16 wherein said audible tones are four column DTMF tones.

18. The method of claim 17 wherein said converting, by the first wireless communications device, of existing user data stored in the first wireless communications device into a sequence of audible tones includes generating a series of DTMF tone pairs for each eight bit value representing said user data.

19. A method of transferring user data between a first wireless communications device and a second wireless communications device, comprising:

a) automatically converting, by the first wireless communications device, existing user data stored in the first wireless communications device into a sequence of infrared light pulses at the first wireless communications device and generally aimed at said second wireless communications device;

b) directly detecting, at the second wireless communications device, said sequence of infrared light pulses produced by the first wireless communications device;

c) converting, by said second wireless communications device, said detected infrared light pulses into transferred user data; and

d) storing said transferred user data in said second wireless communications device.

20. An assembly, comprising:

a) a first wireless communications device having user data therein;

b) a second wireless communications device in direct communication with said first wireless communications device via a medium; and

c) wherein said first wireless communications device automatically and directly transfers said user data to said second wireless communications device via said medium upon initiation by a user.

21. The assembly of claim 20 further including a passive cable and wherein said first and second wireless communications devices are interconnected by said cable and wherein said transferring occurs through said cable.

22. The assembly of claim 20 wherein said first wireless communications device includes a DTMF tone generator and said second wireless communications device includes a DTMF tone detector and wherein said first wireless communications device generates audio tones at said DTMF tone generator and said second wireless communications device deciphers said audio tones at said DTMF tone detector and wherein said transferring of said user data is accomplished using said audio tones.

23. The assembly of claim 20 wherein said first wireless communications device includes an infrared light pulse source and said second wireless communications device includes an infrared light pulse detector and wherein said transferring of said user data is accomplished using said infrared light pulses.

24. The assembly of claim 20 wherein said user data relates to one or more of the following: phone book entries, alarm information, appointment information, and memo information.

25. The method of claim 20 wherein said first wireless communications device is a cellular telephone.

26. The method of claim 25 wherein said first and second wireless communications devices are a cellular telephones.

27. The method of claim 20 wherein:

a) said first wireless communications device includes a transfer protocol programmed therein; wherein said transfer protocol includes sending discrete packets of information; wherein said packets include a start of message indicator, an indicator of data type, a length of data indicator, selected user data, and error detection coding; wherein said transferring of said user data is according to said transfer protocol;

b) said first wireless communications device further includes a DTMF tone generator and said second wireless communications device includes a DTMF tone detector; wherein said first wireless communications device generates audio tones at said DTMF tone generator and said second wireless communications device

deciphers said audio tones at said DTMF tone detector and wherein said transferring of said user data is accomplished using said audio tones; and

c) said user data relates to one or more of the following: phone book entries, alarm information, appointment information, and memo information.

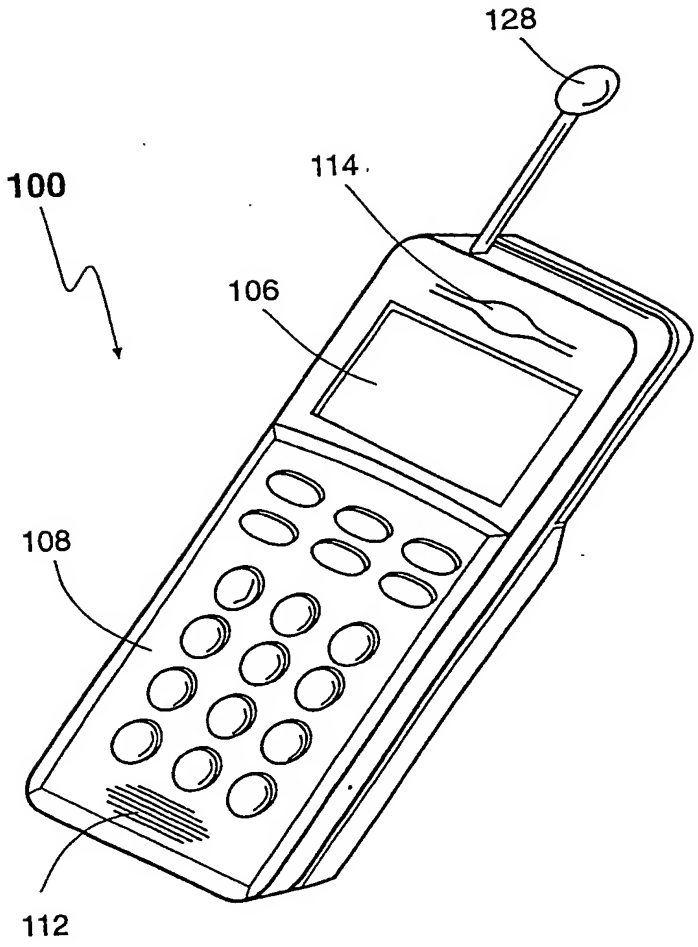


FIG. 1

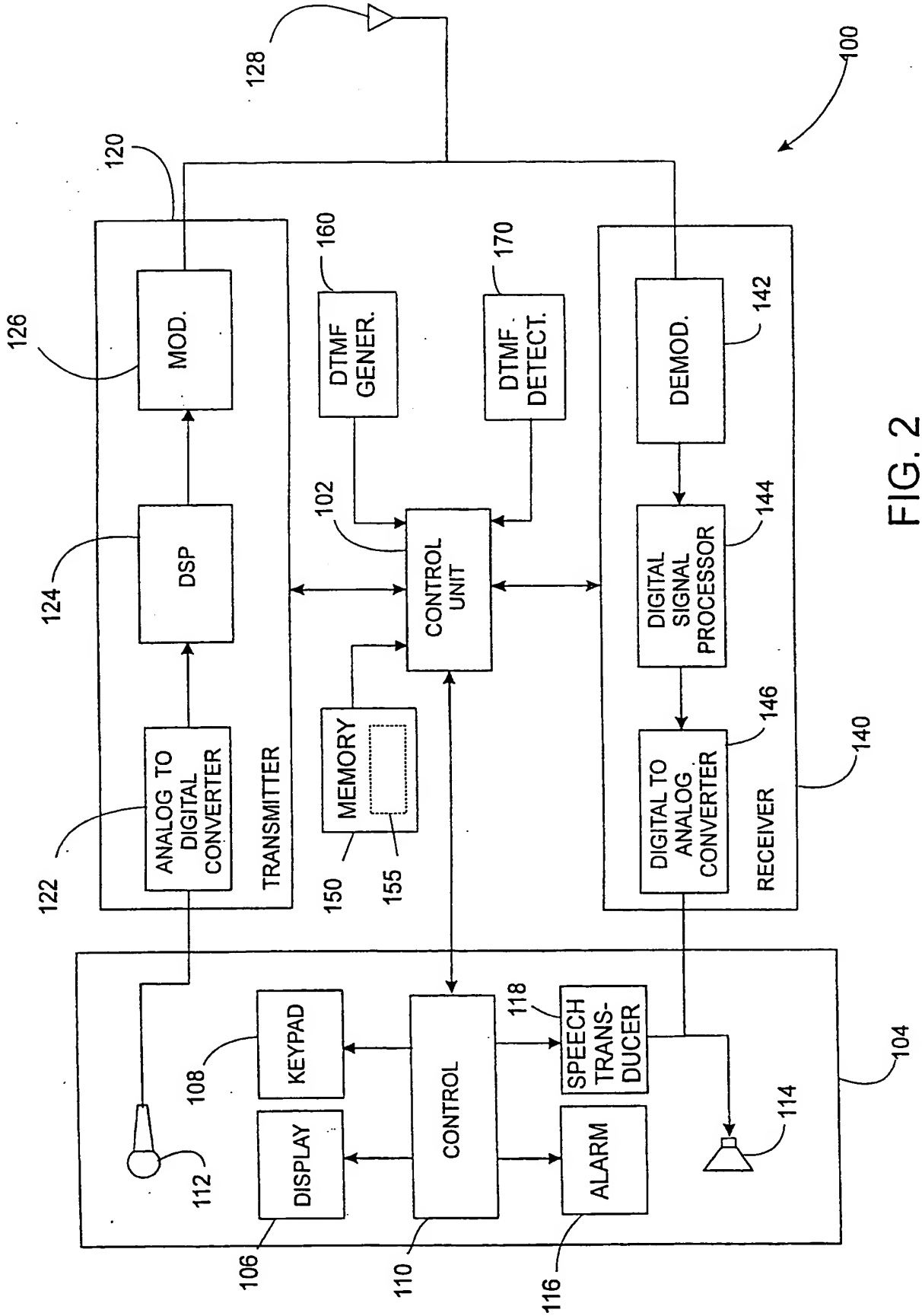


FIG. 2

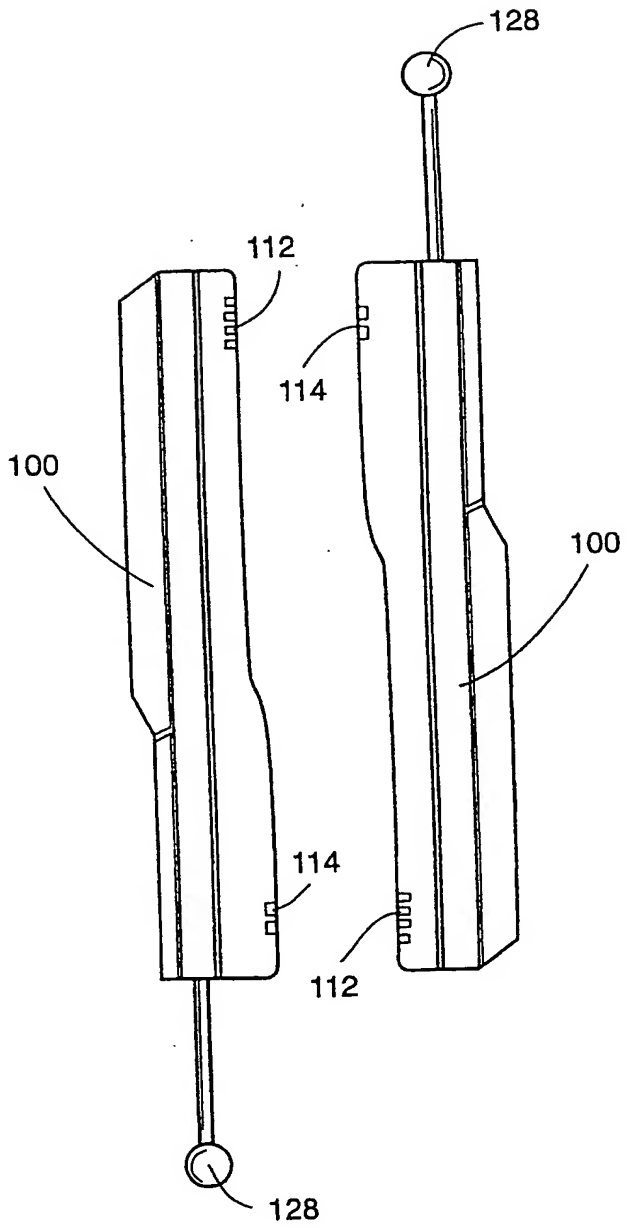


*FIG. 3*

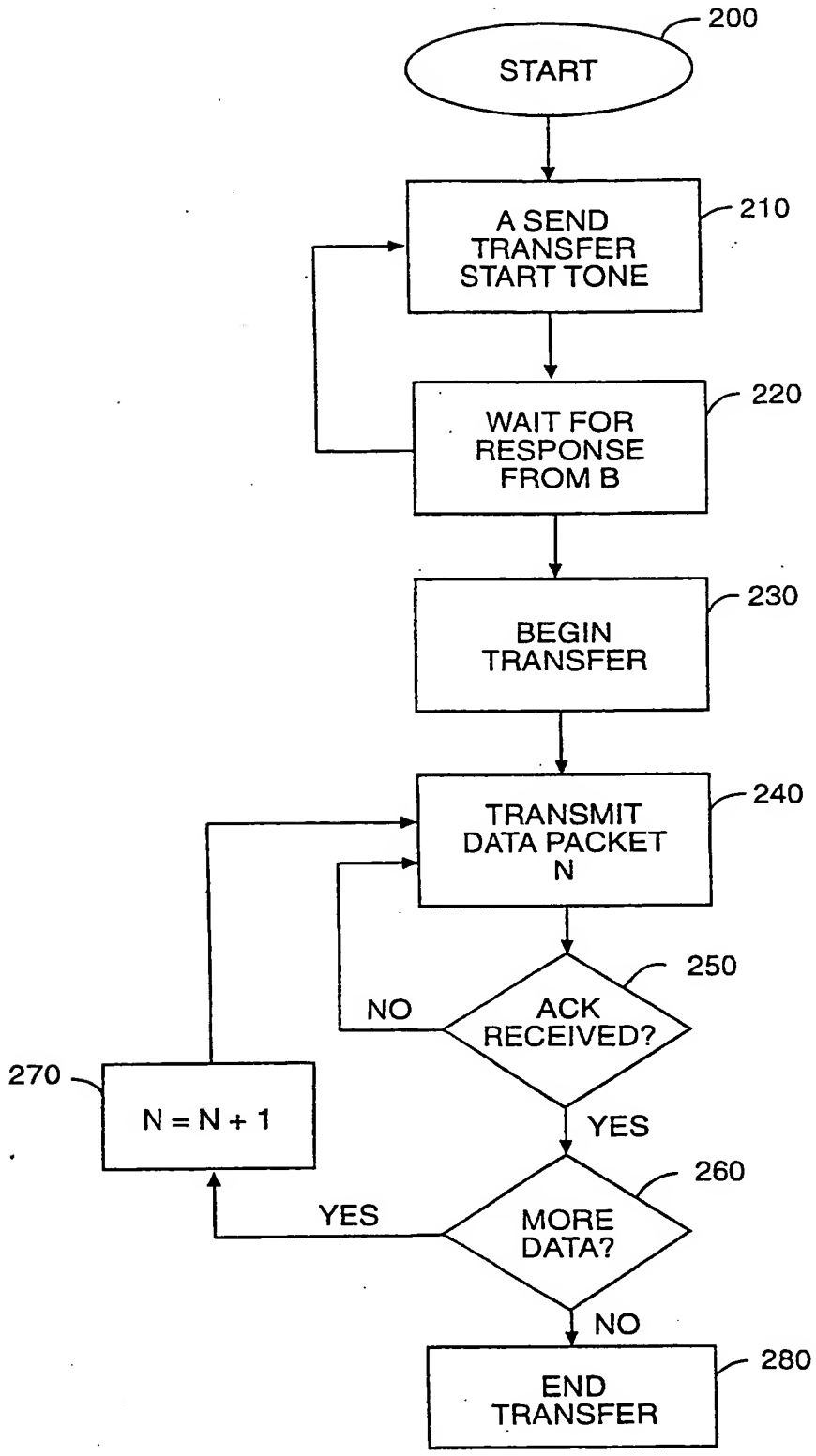


*FIG. 4*

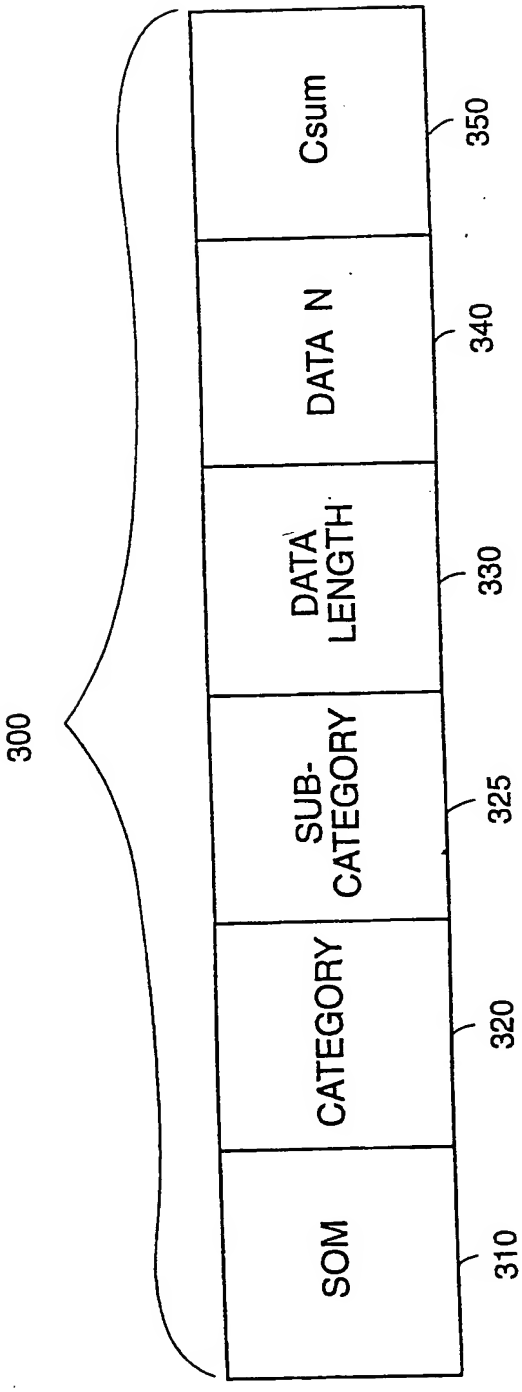


FIG. 5

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/25992

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :H04Q 7/20; H04M 3/00
US CL :455/426
According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 455/426, 418, 419, 420, 88, 564; 379/355

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST
search terms: transfer data, update data, DTMF, protocol, audio tones

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X, P<br>---<br>Y, P | US 5,930,703 A (CAIRNS) 27 JULY 1999, col. 6, lines 47-65; col. 7, lines 19-43; figs. 4, 5 | 1, 3, 5-8, 12-14, 16, 19, 20, 23-25<br>---<br>4, 9, 11, 15, 22, 27 |
| X | US 5,062,132 A (YASUDA ET AL.) 29 OCTOBER 1991, col. 1, lines 53-61; col. 3, lines 48-58; fig. 2 | 1, 2, 20, 21 |
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[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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